But $u = x^2 + m^2y^2$, $v = x^2 - n^2y^2$; therefore

$$F = \pm \int_{\alpha'^2}^{\alpha^2}\int_{\beta'^2}^{\beta^2} \frac{xydudv}{4xy(m^2+n^2)} = \frac{(\alpha^2-\alpha'^2)(\beta^2-\beta'^2)}{4(m^2+n^2)}.$$

SOLUTION BY PROF. ASAPH HALL.

The ratio of the axes of the curves being given, we may write the eq'ns

$$x^2 + m^2y^2 = u; \qquad x^2 - n^2y^2 = v.$$

The product of inertia is given by the integral $\int xydxdy$, and we have to transform this to the variables u and v. The partial derivatives are,

$$\frac{dx}{du} = \frac{n^2}{2x(m^2+n^2)}; \qquad \frac{dx}{dv} = \frac{m^2}{2x(m^2+n^2)};$$

$$\frac{dy}{du} = \frac{1}{2y(m^2+n^2)}; \qquad \frac{dy}{dv} = \frac{-1}{2y(m^2+n^2)}.$$

Forming the known determinant for the transformation we have,

$$\int xy\, dxdy = \frac{1}{4(m^2+n^2)}\int du\, dv = \frac{(\alpha^2-\alpha'^2)\,(\beta^2+\beta'^2)}{4(m^2+n^2)};$$

since the limits of u are α^2 and α'^2, and of v, β^2 and β'^2.

REMARKS ON "NEW RULE FOR CUBE ROOT."—We published on page 98, No. 3, what purports to be a new Rule for Cube Root, and were not aware, at the time, that substantially the same rule had been published before; and we have no doubt the author believed it to be new, and original with him.

The same Rule, in effect, may be found at page 32, Vol. I of the *Mathematical Monthly*, published in Nov., 1859, at Cambridge, Mass. The editor (J. D. Runkle) there says, "In the Nouvelles Mathe'matiques for January, 1858, we find the following method for extracting the cube root of numbers, which ought, on account of its easy application, to be generally used. The editor remarks, in the April number, that the method had previously been given in a work entitled *Calcul pratiques*, in which it is claimed as new. The reader will find the same procees, entitled a new method, in the American edition of Young's Algebra, published as long ago as 1832. It may also be found in some of our arithmetics; and many teachers undoubtedly already know and use it."

PROBLEMS.

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441. *By Wm. Hoover, A. M., Dayton, Ohio.*—A cone revolves around its axis with a known angular velocity. The altitude begins to diminish

and the vertical angle to increase, the volume being constant. Show that the angular velocity is proportional to the altitude.

442. *By Prof. Casey.*—ABN is a given circle, D, F and O are given points in the same plane. It is required to describe a circle passing through D and F and intersecting the given circle in the points G, H, so that the triangle GOH may be of a given magnitude.

443. *By O. H. Merrill.*—In cutting the maximum rectangular parallelopipedon from a frustum of a cone, five pieces are cut off. Find the volume of each of these pieces.

444. *Selected by Prof. H. T. Eddy.*—Given the five equations,

$$x_1^2+x_2^2+x_3^2 = 3\beta^2,$$
$$y_1^2+y_2^2+y_3^2 = 3\alpha^2,$$
$$x_1y_1+x_2y_2+x_3y_3 = 0,$$
$$x_1+x_2+x_3 = 0,$$
$$y_1+y_2+y_3 = 0.$$

Eliminate x_2y_2 x_3y_3, and show that

$$\alpha^2x_1^2+\beta^2y_1^2 = 2\alpha^2\beta^2.$$

(Routh's Dynamics, 4th Edition, Article 38.)

PUBLICATIONS RECEIVED.

Annual Report of the Chief Signal Officer to the Secretary of War for the fiscal year ending June 30, 1881. 8vo. 981 pages, with 69 maps. Washington: 1881.

Transactions of the Wisconsin Academy of Science, Arts, and Letters. Vol. V. 1877–1881. Madison, Wisconsin. 1882.

ERRATA.

On page 169, line 21 (Vol. VI), in the exponent of e, for w read ω.
" " 138, line 13 from bottom (Vol. IX), for b^3, read b_3.
" " 85, lines 10, 11, 12, 14 and 15, read for exponents of x in the last eq'n of the several lines, respectively, 2, 3, n, 2, n.
" " 95, " 6, 8, and 10, divide each fraction before $\int$ by 2.
" " ", line 7, insert y before dy.
" " ", " 10, for $512r^2 \div 525\pi$, read $256r^2 \div 525\pi$.
" " 102, " 3, for y_3, read y^3.
" " 115, " 23, for $(2-2m)$, read $(2+2m)$.
" " 116, " 4, for $= \infty$, read $= -\infty$.
" " 118, " 15 from bottom, for $\frac{3}{2}\frac{8}{7}a$, read $\frac{3}{2}\frac{8}{7}a^3$.
" " 119, at head of Table III, for $-px$, read $+px$.